5.6.3 Receiver Input Impedance

The control channel receiver of an AV device shall have an input impedance measured at the device media terminals greater than 20K ohms over the frequency range 1KHz to 50KHz. These conditions shall be met in the power-off condition and during power-on while in the INFERIOR state. This impedance is measured at the device control channel terminals with a sine wave amplitude of 500 mV p–p.

5.6.4 Noise Immunity Requirements

The receiver will successfully detect either the SUPERIOR or INFERIOR state during the state recognition time provided the respective state is present for a minimum of 90% of the required state recognition time. Figure 5.7 illustrates the two cases of noise rejection required during the SUPERIOR and INFERIOR state recognition time.

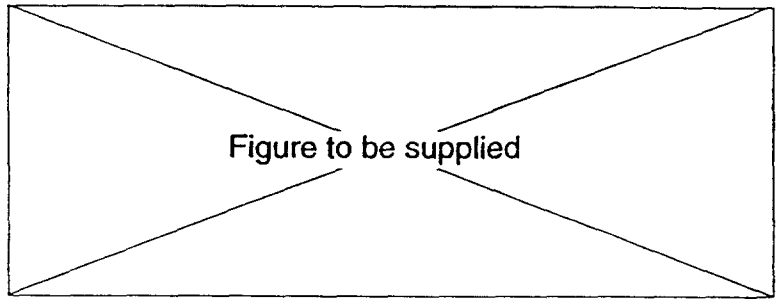

Figure 5.7 Noise Immunity Requirements

5.6.6 Receiver Fault Tolerance

The control channel receiver circuitry of the AV device should be able to tolerate the application of the following faults specified, and after the fault condition is removed, the operation of the receiver shall not be impaired.

- Input terminals shorted together (not touching control bus)
- Input terminals shorted together and shorted to either side of the control bus
- Input terminals shorted together and shorted to earth ground.
- The control bus shorted together while the device is properly connected

5.7 Data Channel Transmitter Characteristics

Any AV Bus data channel transmitter (both audio and video) is assumed to operate in one of two states: a low impedance active state in which signal is being applied to the medium; and a high impedance inactive state when no signal is being applied, and the device is either not powered, or in the receive mode of operation.

Only the transmitter and receiver parameters necessary to ensure electrical compatibility with other data channel devices, insure reliable data channel operation, and minimize media interference are specified in the following sections.

5.7.1 Audio Bus Transmitter

The following specifications apply to the interface of an audio device to the A1, A2, A3, and A4 media pairs. The interface requirements are identical for all audio media pairs. All parameters apply over the frequency range of 0 Hz to 20 KHz unless otherwise stated.

5.7.1.1 Active State

During the active, low impedance state the audio medium transmitter output impedance shall be 120 ohms ± TBD ohms between the audio medium connector pins. Output impedance shall be 60 ohms ±TBD ohms between each audio medium connector pin and the CMR line.

The *maximum*?? differential output voltage amplitude (Vdif) at the audio medium connector, driving the test circuit of Figure 5.8 in either switch position, will be 2V RMS.

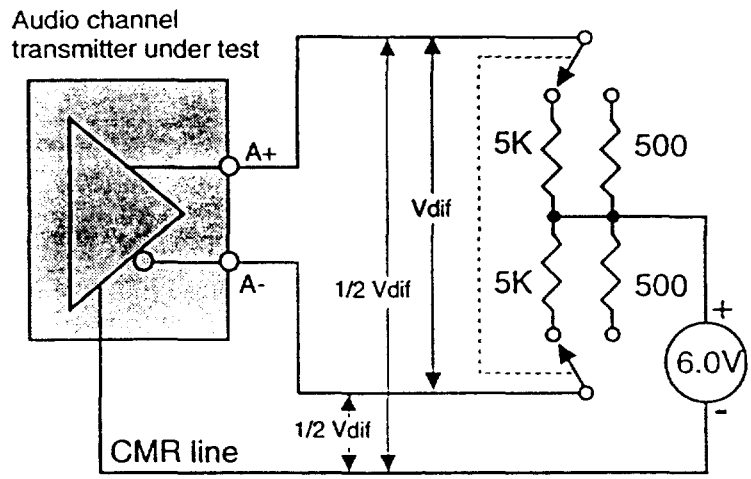

Figure 5.8 Audio Channel transmitter test circuit

The gain symmetry of all audio medium transmitters between audio medium lines will be less than 1% from DC to 20 KHz when driving the test circuit of Figure 5.8.

5.7.1.2 Inactive State

During the inactive, high impedance state the audio media transmitter circuit should maintain an output impedance between 10K ohms and 1M ohms. The output impedance should be between 5K ohms and 1M ohms between each audio medium connector pin and the CMR line. There will be less than 30μV p-p?? output signal into a 10K ohm load, at any frequency during the inactive state.

5.7.1.3 Common Mode Output Voltage

The magnitude of the common mode output voltage (Vcm) of the audio medium transmitter, in either the active or inactive state, measured between the midpoint of a test load shown in Figure 5.9 and the CMR line, shall be 6.0 V ±TBD volts.

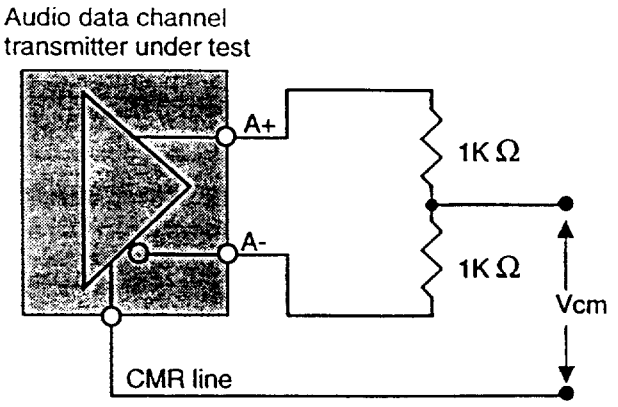

Figure 5.9 Audio Common Mode Output Test Circuit

5.7.1.4 DC Offset Voltage

The magnitude of the audio medium transmitter DC offset voltage, measured across the audio medium connector pins with a 10K ohm load, in either the inactive state or active state with no input signal, shall be less than ±TBD volts.

The change in the DC offset voltage while transitioning from the inactive state to the active state shall be less than ±TBD volts.

5.7.2 Video Bus Transmitter

The following specifications apply to the interface of a video device to the V1, V2, V3, and V4 medium pairs. The interface requirements are identical for all video media pairs. All parameters apply over the frequency range of 0Hz to 5.0MHz.

5.7.2.1 Active State

During the active, low impedance state the video medium transmitter output impedance shall be 120 ohms ± TBD ohms between the video medium connector pins. Output impedance shall be 60 ohms ±TBD ohms between each video medium connector pin and the CMR line.

The *maximum*?? differential output voltage amplitude (Vdif) at the video medium connector, driving the test circuit of Figure 5.8, will be 1 volt p-p ±TBD volts.

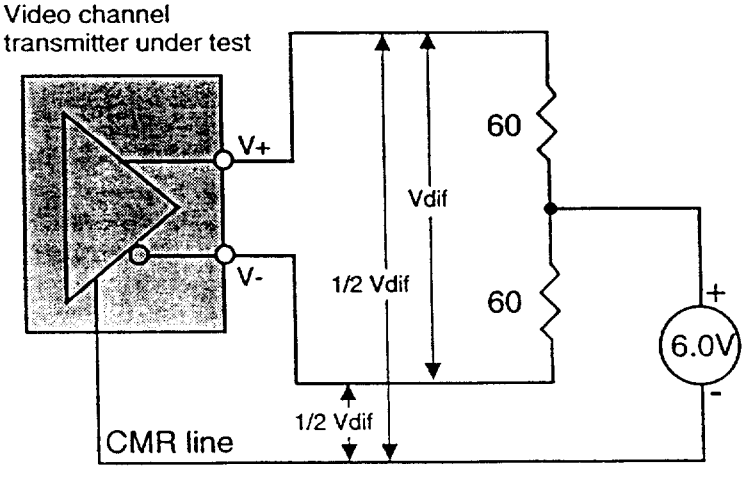

Figure 5.10 Video Channel transmitter test circuit

The gain symmetry of all video medium transmitters between video medium lines will be less than 1% from DC to 20 KHz when driving the test circuit of Figure 5.10.

5.7.2.2 Inactive State

During the inactive, high impedance state the video media transmitter circuit should maintain an output impedance between 3K ohms and 1M ohms. The output impedance should be between 1.5K ohms and 1M ohms between each video medium connector pin and the CMR line. There will be less than 30μV p-p?? output signal into a 60 ohm load, at any frequency during the inactive state.

5.7.2.3 Common Mode Output Voltage

The magnitude of the common mode output voltage (Vc) of the video medium transmitter, in either the active or inactive state, measured between the midpoint of a test load shown in Figure 5.11 and the CMR line, shall be 6.0 V ±TBD volts.

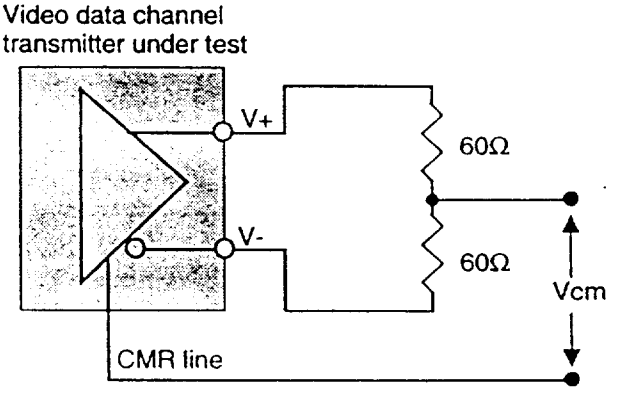

Figure 5.11 Video channel common mode output test circuit

5.7.2.4 DC Offset Voltage

The magnitude of the video medium transmitter DC offset voltage, measured across the video medium connector pins while connected to the test circuit of figure 5.10, in either the inactive state or active state with a 30 IRE input signal, shall be less than ±TBD volts.

The change in the DC offset voltage while transitioning from the inactive state to the active state shall be less than ±TBD volts.

5.7.3 Data Channel Transmitter Fault Tolerance

Any audio or video transmitter, while in either the active or inactive state, shall tolerate the application of each of the following faults indefinitely; and after the fault condition is removed, the operation of the driver shall not be impaired. In addition, the magnitude of the sink or source current from the driver under any of the fault condition specified shall not exceed 10mA.

- Output terminals shorted together (not touching medium).
- Output terminals shorted together and shorted to either or both conductors of the medium pair.
- Either or both output terminals shorted to CMR line.

5.8 Data Channel Receiver Characteristics

Any AV Bus data channel receiver on any AV media (both audio and video) is assumed to operate in a high impedance state. The following specifications must be meet while the device is connected to the media.

Only the receiver parameters necessary to ensure electrical compatibility with other data channel devices, insure reliable control channel operation, and minimize media interference are specified in the following sections.

5.8.1 Audio Bus Receiver

The following specifications apply to the interface of an audio receiving device to the A1, A2, A3, A4 pairs. The interface requirements are identical for all audio media. All parameters apply over the frequency range of 0 Hz to 20 KHz unless otherwise stated.

5.8.1.1 Audio Channel Input Impedance

The audio medium receiver shall have an input impedance, measured at the device audio media terminals, between 10K ohms and 1M ohms. The input impedance shall be between 5K ohms and 1M ohms between each audio medium connector pin and the CMR line. These conditions shall be met in the power-off or power-on condition. This impedance is measured at the audio medium terminals of the AV Bus connector with a differential sine wave amplitude of 1.0V p–p??.

5.8.1.2 Received Signal Conditions

The audio medium receiver shall operate normally with a received signal range of 2.0 volts RMS maximum while in the presence of a common mode voltage of 6.0 volts ±TBD volts from either audio terminal to reference GND (as shown in Figure 5.12), and a DC offset voltage of ≤ ±TBD between audio terminals.

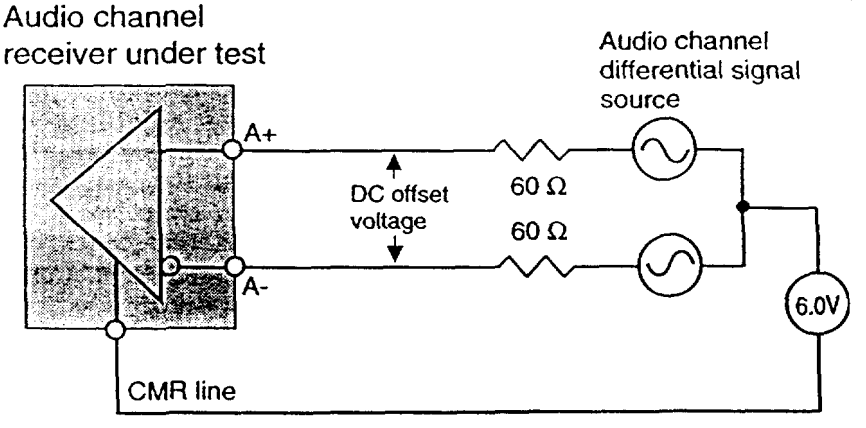

Figure 5.12 Audio receiver common mode test circuit

5.8.1.3 Common Mode Rejection Ratio

The audio receiver will have a common mode rejection ration ≥ 60 dB measured at 20 KHz.

5.8.1.4 Media Isolation

Any audio medium receiver will provide a minimum of 80dB of signal isolation between the connected medium and all other AV bus media and all other non-AV bus signals in or out of the AV device.

5.8.2 Video Bus Receiver

The following specifications apply to the interface of a video receiving device to the V1, V2, V3, and V4 pairs. The interface requirements are identical for all video media. All parameters apply over the frequency range of 0 Hz to 5.0 MHz unless otherwise stated.

5.8.2.1 Video Channel Input Impedance

The video medium receiver shall have an input impedance, measured at the device video media terminals, between 3K ohms and 1M ohms. The input impedance shall be between 1.5K ohms and 1M ohms between each video medium connector pin and the CMR line. These conditions shall be met in the power-off or power-on condition. This impedance is measured at the video medium terminals of the AV Bus connector with a differential sine wave amplitude of 1.0V p–p??.

5.8.2.2 Received Signal Conditions

The video medium receiver shall operate normally with a received signal range of 1.0 volts p-p maximum while in the presence of a common mode voltage of 6.0 volts ±TBD volts from either video terminal to reference GND (as shown in Figure 5.13), and a DC offset voltage of ≤ ±TBD between video terminals.

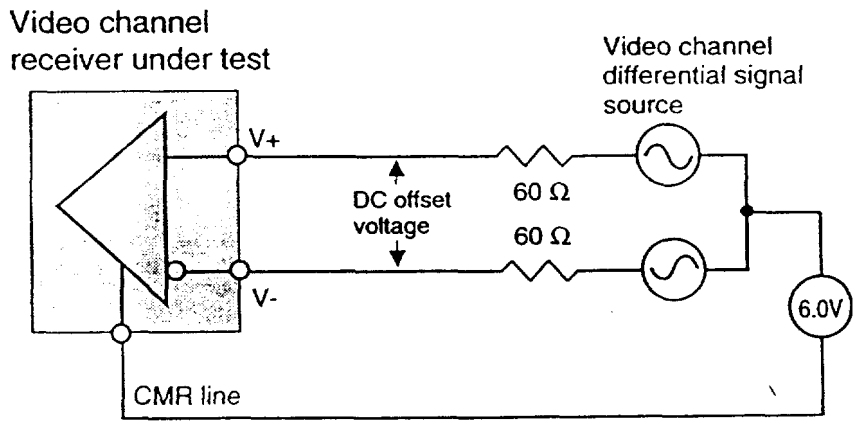

Figure 5.13 Video receiver common mode test circuit

5.8.2.3. Common Mode Range

The video receiver will have a common mode rejection ration ≥ 35 dB measured at 4 MHz.

5.8.2.4 Media Isolation

Any video medium receiver will provide a minimum of 80dB of signal isolation between the connected medium and all other AV bus media and all other non-AV bus signals in or out of the AV device.

5.9 Common Mode Reference Line

The common mode reference line medium contacts of each AV device will be internally connected together and will connect to the device circuit common through an internal series resistance of 100 ohms??

5.10 Device Failure Modes

Detecting the cause of a bus failure due to a failing device or bad connection is very difficult in a bus where all devices are connected in parallel. For this reason, extra precaution should be taken to insure the design of each device meets the required failure mode specifications.

5.10.1 Electrical Failure

A device which experiences an electrical failure to render the device inoperative should fail in an INFERIOR state on the bus. No device failure will leave the control channel Physical Layer in a low impedance state on the bus.

5.10.2 Control Channel Jabber Inhibit

The control channel Physical Layer of each device shall contain a jabber inhibit section which shall monitor the length of time the transmitting element is active. If a node asserts the SUPERIOR state continuously for a period longer than 1000 unit symbol times then the node must disconnect from the network or revert to a state equivalent to the INFERIOR state for a period greater than 10 seconds before attempting to re-connect The jabber inhibit shall then resume monitoring. This sequence may then be repeated..

6 AV Media Node 0 Requirements

6.1 Control Channel Routing

A Control channel router device may be attached to the AV network for routing of control channel messages to any other media including additional AV networks. A router device must meet all Physical Layer requirements of an AV device as described in section 5 of this document. Complete specifications for CEBus control channel router devices are given in IS-60.03 Part 8.

A router may attach to the AV network at any point using a network connector. It may exist as a separate device or may be built into an AV device.

6.2 Data Channel Bridging

AV data channels may be bridged between AV media on two different AV networks, or between AV media and another CEBus media (PL, CX, etc.). A data channel bridge must meet all data channel Physical Layer requirements of an AV device and must meet all signal frequency and level requirements for the data channels it bridges on each media. Complete specifications for data channel bridges are given in IS-60.03 Part 8.

A data channel bridge may attach to the AV network at any point in the network using a network connector. It may exist as a separate device or may be built into an AV device.

REFERENCES